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BIOMEDICAL SIMULATOR

The Biomedical Simulator simulates four functions ECG1, ECG2, Phonocardiogram, and Blood Pressure with Korotkow sound superimposed. The ECG1, ECG2, and Phonocardiogram functions provide adjustable low level differential output signals superimposed on an adjustable bias level. The Blood Pressure output signal is a simulated differential signal. All signals are available both at connector, J1, on the rear of the chassis and also at the oscilloscope test points on the front panel.

The ECG and Phonocardiogram signals are generated by a rotating function wheel between a light source and photoconductor cells. A voltage variable 60 cycle motor turns the function wheel. This motor should always be started at maximum voltage and then slowed down to desired running speed, or BPM (beats per minute).

The Blood Pressure signal is a 32 second periodic ramp function with the phonocardiogram signal superimposed on the ramp. The ramp is generated by counting with five flip-flop circuits the output of the uni-junction oscillator, Q1, set for one pulse per second by R4. After 32 seconds have been counted three one shot circuits are triggered simultaneously. By adjusting R84 properly the output ramp is shaped for a rise time of 8 seconds and a decay time of 24 seconds. The Korotkow sounds on the decay portion of the ramp can be turned on and off at the proper levels by adjusting R85 and R86 respectively. R86 should be adjusted to turn on the sound approximately 1/3 of the way down the ramp, i.e. 1/3 of the peak-peak ramp signal; and R88 adjusted to turn off the sound 2/3 of the way down.

All output signals and bias levels are increased by adjusting the respective potentiometers CW on the front panel; and decreased by a CCW adjustment.

In normal operation with the Gemini Programmer all bias levels will be set to 10 MV. The ECG1 signal will be set to about 10 MV poistive going and the ECG2 signal to 10 MV negative going. The Phonocardiogram signal will be set to about 15-17 MV peak-peak, and the Blood Pressure signal likewise.

The D.C. voltage should be applied to the unit at least one (1) minute prior to use in order that all of the large capacitors can charge and stabilize.

A discrepancy has been noted between the input signal levels to the Gemini Programmer and the output levels as observed on the PCM Work Display Panel. The discrepancy is not yet fully understood although it is being investigated. However, the Biomedical Simulator was designed not only for differential output signals but also single-ended output signals, therefore, there is enough signal available to drive the programmer. In the instrumented aircraft system the differential output signals will be used, and any common tie points between the Programmer low level differential inputs should be removed prior to connecting the Biomedical Simulator into the system.